SYSTEM FOR LOADING/UNLOADING CONTAINERS

FIELD OF THE INVENTION

This invention relates to a container handling system for a vehicle, more specifically it relates to a system for loading and unloading large containers from wheeled vehicles.

BACKGROUND OF THE INVENTION

The art typically refers to systems for loading and unloading containers as "hook lifts." These systems have been extensively employed for the transport of various materials within the container. In the usual case, the container may be loaded or unloaded upon the bed of the truck or vehicle utilizing the hook lift system. One very typical and frequent use for such systems is in the picking up and hauling of refuse. An open top or closed top container may be delivered to a point of use and the hook lift used to deploy the container, which contains a lift bar, A-frame or other similar connection to engage the hook, on the terrain underlying the truck where it is left to be filled with refuse or the like. When the container is full, the truck returns to the point where the container has been deposited and through the use of the hook lift system, elevates the filled container onto the truck where it may be transported, along with its contents, to a location where the container is unloaded and emptied, like a landfill or other facility. Examples of hook lift systems are found in U.S. Patent Nos. 6,558,104; 5,601,393; 4,350,469; 3,874,537; 3,964,625; and 4,204,793.

In addition to hook lifts, the art is familiar with cable hoist systems which accomplish the same loading and unloading function of the hook lift systems but use a cable winch system as described in U.S. Patent No. 5,460,473. In this type of a system

two hydraulic cylinders are typically used to move the cable about a fixed sheave attached to the front end of the vehicle hoist frame. In the fully retracted position the cable, which is wrapped around sheaves connected to the cylinders, is at its longest affective length and can be connected to the front end of a container located on the ground. As the cylinders extend, the effective length of the cable continuously shortens as it wraps around each of the two cylinder sheaves and then finally around the sheave attached at the front end of the hoist frame. As the effective length of the cable gets shorter, the container is pulled up and onto the vehicle, which is usually in a tilted position to facilitate loading and unloading of the container. Another more limited and specific type of lift mechanism is found in U.S. Pat. No. 3,130,847 that uses a bail device mounted on a reciprocating carriage assembly. The bail engages a plurality of specifically designed hook bars located and space along the underneath portion of the container. As the carriage is reciprocated back and forth along a short path at the back end of the hoist frame the successive reciprocation causes the bail to engage the next hook bars and causing the container to move forward a short distance. The reciprocation of carriage eventually pulls the container onto the hoist frame in a slow stepwise fashion. One major problem with all these existing systems for loading and unloading containers is that they each contain only one type of mechanism to pick-up a specific type of container. For example, in the case of the hook lift it can only pick up containers designed specifically to accept the hook and likewise, the cable winch system can only pick up containers designed for cable based systems. Thus, companies must at a minimum maintain and operate two types of vehicles, those with hook lifts and those with cable winches. A need therefore exists for a universal type of

loading and unloading system that can load, transport, and unload all types of containers, including, but not limited to those containers specifically designed for conventional cable hoists or hook lifts. In other words, there is a need for a system that has both a hook lift and a cable winch that can be used interchangeably depending on the many various designs of containers or other structures that require loading, transportation and unloading.

My invention solves this problem by using a sliding carriage design that transverses the entire length of an elongated body to allow all types of container and structure designs to be loaded, transported on a wheeled vehicle and unloaded.

SUMMARY OF THE INVENTION

It is the principle object of my invention to provide an improved system for loading and unloading containers and/or structures regardless of the design of container and/or structure, more specifically whether or not a container is designed as a hook lift or cable winch container.

Another object of my invention is to provide a system for attachment to a wheeled vehicle that allows an operator of the vehicle to service any type of container/structure without mechanical modification of the system prior to servicing the particular container/structure design.

One particular embodiment of my invention includes an elongated body that is attached to the wheeled vehicle's frame. The elongated body has a carriage that can slide the length of the body and is driven by a central hydraulic cylinder, such that when the cylinder is fully extended the carriage is positioned near the front end of the elongated body. By "front" or "front end" I mean generally a position that is towards the front or closest to the cab and engine of the vehicle, i.e. a position that is more towards the front than the middle. Likewise, when the cylinder is fully retracted the carriage is positioned at the rear or opposite end of the elongated body. Again, by "rear" or "rear end" I mean generally a position more towards the back end of the wheeled vehicle, i.e. more towards the back than the middle. This would require that one end of the central cylinder to be fixed at the rear end of the elongated body with the other end fixed to the carriage. The end of this cylinder that is fixed to the carriage can be the piston or rod end of the cylinder. Alternatively, the central cylinder could have one end fixed to the front end of the elongated body and the other end to the carriage. In this configuration,

when the cylinder is fully retracted the carriage is positioned at the front of the elongated body.

The elongated body is pivotally connected to the vehicle frame near the rear end of the frame. One or more hydraulic cylinders is pivotally attached to a support member located on the front portion of the vehicle frame and to the elongated body near the front end such that when the cylinder is fully retracted the elongated body is in a horizontal position parallel to and adjacent to the vehicle frame. When this cylinder begins to extend the front end of the elongated body moves upward in an arcuate path while the rear most end of the body moves downward. The pivot point being the connection between the vehicle frame and the elongated body located in the rear portion of the body. Raising the front end of the body while lowering the rear end facilitates loading and unloading the container. The body also contains a number of rollers or other friction reducing surfaces positioned along the length of the body which also makes loading and unloading easier by reducing the friction between the container bottom and the body.

As mentioned, the carriage is slidably connected to the elongated body and can move along the body from front to rear along a track using bearing shoes or other friction reducing mechanism, such as rollers. The carriage contains the means or mechanism that connects to the container allowing the container to be pulled up and onto the elongated body. This mechanism may be a cable and sheave combination or a jib and hook device or a combination of both. If the carriage contains the jib and hook device, it will also contain at least one hydraulic cylinder that is capable of moving the jib and hook device through an arcuate path such that when the elongated body is in an

elevated position the hook can engage an A-frame on a container, a ring, a trunion, lift bar, or other similar connector on the container. This will be more fully understood with reference to the figures and the description of a preferred embodiment described below.

Once the hook has captured or engaged the container, the cylinder(s) are extended to move the jib and hook device to its original starting point. Alternatively, depending on the orientation of these cylinders, they can be retracted to move the jib and hook device to its original starting point. The central hydraulic cylinder connected to the carriage is then operated (either retracting or extending depending on the configuration) to move the carriage from the rear of the elongated body to the front end and in so doing pulling the container along with it until the container is fully positioned on the elongated body. The cylinder(s) that elevated the elongated body is then retracted lowering the front portion of the body until it is in a horizontal or starting position parallel to the frame of the vehicle. However, it is within the scope of my invention that each of the hydraulic cylinders can be operated simultaneously. In other words, the elongated body can be moved at the same time as the sliding carriage and the hook and jib mechanism.

When the cable and sheave combination is used on the carriage, one end of the cable is fixedly attached preferably to the rear end of the elongated body. Alternatively, the fixed end of the cable can be attached to a cross member on the elongated body located in the rear portion of the body, or attached to the central cylinder in the rear portion of the body. The other free end of the cable is passed around a sheave that is fixed to the carriage. When the carriage is positioned at the rear of the elongated body, the free end of the cable is of sufficient length that it can be attached to a container

designed to be used with a traditional cable winch system. The free end of the cable may contain a hook, latch, clasp or other suitable device to allow it to be removably connected to the container. Once the cable is connected to the container, the vehicle operator operates the central hydraulic cylinder causing the carriage to move to the front end of the elongated body. As the carriage moves forward so does the cable sheave which in turn reduces the length of the free end of the cable and thus pulls the container onto the elongated body. Because the cable is attached to the rear end of the body and is of a fixed length, when the carriage reaches the front of the elongated body the container is necessarily pulled all the way onto the body. Once the carriage is positioned to the front of the body and the container is fully on the body, then the cylinder(s) that lift the body is retracted, lowering the body and container to a horizontal or starting position. Again, there is no requirement that each cylinder or set of cylinders be operated in serial fashion and it is well within the scope of my invention that the cylinders may be operated simultaneously. When loading and unloading containers with the cable and sheave combination it is preferably, but not necessary, that the jib and hook remain in the upright and stowed position. Further details of the components and operation of the system will be evident from the following description of a preferred embodiment.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top view of the loading and unloading system of my invention.

FIG. 2 is a side view of the system of my invention with the carriage in the forward position.

FIG. 3 is a side view of my invention connected to a wheeled vehicle where the slidable carriage in the rear position.

FIG. 4 is a side view of my invention connected to a wheeled vehicle where the jib and hook device is connected to a container.

FIG. 5 is a side view of my invention using the jib and hook device and with the elongated body elevated at the front end to facilitate loading of the container.

FIG. 6 is a side view of my invention with the elongated body elevated using the cable and sheave combination to load a container.

FIG. 7 is a side view of my invention showing the cable and sheave combination loading a container onto a partially elevated elongated body.

FIG. 8 is a side view of my invention showing the hook and jib device being used to load a container onto a partially elevated elongated body.

FIG. 9 is a side view of my invention using the jib and hook device showing a container fully loaded and with the carriage at the front position.

FIG. 10 is a side view of my invention using the cable and sheave combination and showing a container fully loaded and with the carriage at the front position.

FIG. 11 is a perspective view of my invention showing the slidable carriage containing the jib and hook device and the central cylinder.

FIG. 12 is a perspective view of the slidable carriage of my invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Illustrated in Figures 1 through 11 are top, side and perspective views, respectively, of system **10** of my invention shown alone and as removably attached to a wheeled vehicle frame **22**. The system of my invention includes, among other items, elongated body **11** with carriage **13** slidably connected thereto. Carriage **13** may contain one or more mechanisms that are capable of connecting to a container for loading and unloading purposes. Carriage **13** slides along the entire length of elongated body **11** using bearing shoes **15** and is moved by action of a central hydraulic cylinder **12**, which preferably is a multi-stage cylinder. As explained, central cylinder **12** is fixed at one end to carriage **13** and at the other end to elongated body **11**. As cylinder **12** retracts, carriage **13** moves in direction **50** toward the rear **40** of the body. At the fully retracted position of cylinder **12,** carriage **13** is at the rear end **40** of body **11** as illustrated in Fig. 3.

Once carriage **13** is positioned at the rear of the body the operator can use either the jib **18** and hook **19** device or cable **20** and sheave **17** combination to engage container **35**. The particular engaging mechanism will depend on the specific design of the container. If the container has a lift bar **36** and is designed to be engaged by a hook lift type mechanism, then cylinders **14** on carriage **13** will be activated to raise jib **18** about pivot point **37** as shown in Fig. 4. In the raised position hook **19** can then engage lift bar **36** on container **35**. Container **35** can be elevated and lifted onto elongated body **11** in at least two ways. The first is where cylinders **14** on carriage **13** are retracted which causes container **35** to be lifted up and onto the rear end **40** of body **11**. Once

cylinders **14** are fully retracted and jib **18** is returned to the starting position, the container will be up on the end of body **11**. Carriage **13** is then moved toward front end **30** of the body by extending cylinder **12**. This will cause container **35** to move toward the front end of body **11** via travel on rollers **16** or other type of friction reducing mechanism or bearing surface. When carriage **13** reaches the front end of body **11** the container will be fully loaded as shown in Fig. 10.

Alternatively, the container can be loaded by tilting body **11** as shown in Figs. 5 and 6. Tilting body **11** is accomplished by extending hydraulic cylinder **24**, which typically has a companion cylinder located on the opposite side of the vehicle frame **22**. Hook **19** can engage lift bar **36** either before or after body **11** is tilted. As shown in Fig. 6, if container **35** is of the type requiring loading by a cable mechanism, cable **20** and engaging mechanism **21** is attached to container **35** while body **11** is in the tilted position. Once the cable (or hook) is attached to container **35,** carriage **13** is moved by central cylinder **12** as shown in Figs. 7 and 8 in direction **51** towards front end **30**. As carriage **13** moves towards front end **30**, cable **20** is pulled around sheave **17** such that the distance between container **35** and jib **18** continuously decreases until the container and the jib are adjacent to each as shown in Fig. 10. At this point the container is fully loaded onto body **11**. If the carriage was moved forward while body **11** was in a tilted position, then cylinder **24** would then be retracted to bring body **11** and container **35** to a horizontal position parallel with vehicle frame **22** as shown in Fig. 9.

Although the invention has been described with respect to preferred embodiments, it is to be also understood that it is not to be so limited since changes and

modifications can be made therein which are within the full scope of this invention as detailed by the following claims.